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GAME WARDENS' RETIREMENT SYSTEM
STATE OF MONTANA
ACTUARIAL VALUATION
As of JULY 1, 1992

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Game Wardens' Retirement System

State of Montana

Actuarial Valuation

As of July 1, 1992



Game Wardens' Retirement System

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Game Wardens' Retirement System

Section I

Introduction

An actuarial valuation of the Game Wardens' Retirement System of the State of Montana has been completed as of July 1, 1992. This valuation was authorized by the Public Employees' Retirement Board under Section 19-8-202, MCA. The purpose of the valuation was to determine the financial position of the fund, the normal cost, and the unfunded accrued liability based upon present and prospective assets and liabilities of the system as of July 1, 1992.

Section II presents an analysis of the results of the actuarial valuation. The numerical findings and membership data supporting this analysis are shown in Section III.


In conducting the actuarial valuation, certain assumptions were made as to the future experience of the system. A summary and discussion of each of the assumptions is contained in Section IV.

The valuation is based upon the Game Wardens' Retirement Act and incorporates all amendments as of July 1, 1992. A summary of the major provisions of the Act is contained in Section V.

Actuarial Certification

The results of the actuarial valuation shown in this report are based upon information provided by the Public Employees' Retirement Division regarding plan participants, plan assets and other matters. The values have been calculated on the basis of actuarial assumptions which, in my opinion, are appropriate for purposes of this valuation.

This valuation has been prepared in accordance with generally accepted actuarial principles and practices and, to the best of my knowledge, fairly reflects the actuarial position of the Game Wardens' Retirement System as of July 1, 1992.


Alton P. Hendrickson
Member, American Academy
of Actuaries



Game Wardens' Retirement System

Section II

Analysis of Valuation

Results of Valuation

An actuarial valuation has been conducted for the Game Wardens' Retirement System as of July 1, 1992. This valuation has determined that the percent of each member's compensation required to fund the benefits as they accrue in the future is 16.04%. The regular contribution rate of 23.05% allows 7.01% to be applied to the unfunded past service liability. This percent is sufficient to amortize the unfunded past service liability over a period of 4.06 years. This period has decreased from 8.78 years in 1990.

Asset Valuation

Past actuarial valuations have valued assets at market value, with gain and loss fluctuations smoothed over a 6-year period. This procedure has been conservative and slow to recognize recent market performance. The current actuarial valuation has accelerated the rate at which gains and losses are recognized by smoothing the fluctuations over a shorter period of 4 years. The table below illustrates this valuation procedure:

	Actual		Adjusted
	-----		-----
Cost Value as of 6/30/92	12,608,194		12,608,194
1992 Market Gain	770,773	x .25	192,693
1991 Market Gain	202,270	x .50	101,135
1990 Market Gain	102,305	x .75	76,729
Prior Market Gain	946,157	x 1.00	946,157
	-----		-----
Market Value as of 6/30/92	14,629,699		13,924,908

Investment Performance

The rate of investment return during 1991-92 was 13.93% on a market value basis and 8.80% on a cost value basis. These rates were based on all assets of the system including accruals, and assumed uniform fund activity throughout the year.

Contributions

The member contribution rate is 7.9% of compensation and the employer's is 7.15%. In addition, amounts collected from fines and forfeited bonds will be contributed until the unfunded liability is solvent. At this time, the fines and bonds represent 10.1% of compensation. This amount will represent a declining percent of the payroll as compensation increases. For purposes of this valuation, a weighted-average rate of 23.05%.



Amortization of The Unfunded Liability

An amortization schedule has been prepared as part of each biennial valuation to amortize new liability gains and losses over a 40-year period. The amortization period of past liabilities decreases 2 years with each valuation. The schedule began with an initial liability established on July 1, 1984.

The Public Employees' Retirement Board has set a goal of funding liabilities over a period not to exceed 30 years. The schedule in this report illustrates the rate required to fund each valuation's new liabilities over a 30-year period.
Actuarial Assumptions

The actuarial assumptions used in the valuation of July 1, 1990 were continued in this valuation. A review of the system's data and experience did not reveal any deviations which warranted a change.

Summary of Data

The active membership was 87 on July 1, 1992 which was a decrease by 1 member from July 1, 1990. The annual payroll increased from \$2.25 to \$2.47 million during the biennium. The average pay per member grew at the rate of 5.3% per year.

The average active member is 39.6 years of age, was employed at age 26.3, has completed 13.3 years of service, and earns \$28,346.

The number of members receiving benefits was 61 on July 1, 1992. The number receiving benefits grew by 3 from July 1, 1990. The annual benefit payout increased from \$707,241 to \$795,475 during the biennium. The benefit payout per member grew at the rate of 3.4% per year.

The average retiree is 66.9 years of age, retired at age 57.2 with 28.1 years of service, and receives a benefit of \$1,151 per month.

Conclusion

Because of increased payroll and benefit payouts, the system's total liability grew by 10.4%. This was offset by a 21.3% growth in assets. The current funding level allows the system's unfunded liability to be funded over 4.06 years compared to 8.78 years in 1990. Part of this decrease is attributable to smoothing market value changes over 4 years rather than 6.

Based on the results of this valuation, the Game Wardens' Retirement System is actuarially sound.



Game Wardens' Retirement System

Section III

Schedule 1

Normal Cost Allocation

(1) Normal Cost Contribution Rate:

(a) Retirement	14.27%
(b) Death	0.47
(c) Disability	0.82
(d) Vested	0.16
(e) Withdrawals	0.32

(f) Total Rate	16.04%

(2) Present Value of Future Salaries
Of Current Members \$ 20,108,245

(4) Present Value of Future Normal Costs
For Current Members (1(f) * (2)) \$ 3,225,362



Game Wardens' Retirement System

Schedule 2

Present Value of Benefits

(1) Present Value of Benefits - Inactive Members

(a) Retirement	\$ 6,185,112
(b) Death	190,283
(c) Disability	902,301
(d) Vested	0
(e) Withdrawals	2,954
(f) Benefit Adjustment	49,907

(g) Total Inactive	\$ 7,330,557

(2) Present Value of Benefits - Active Members

(a) Retirement	\$ 9,824,570
(b) Death	183,972
(c) Disability	319,742
(d) Vested	67,735
(e) Withdrawals	106,300

(f) Total Active	\$ 10,502,319

(3) Total Liabilities	\$ 17,832,876
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Game Wardens' Retirement System

Schedule 3

Liability Allocation and Statutory Funding

(1) Unfunded Past Service Liability

(a) Present Value of Benefits	\$ 17,832,876
(b) Present Value of Future Normal Costs	\$ 3,225,362
(c) Fund Assets	\$ 13,924,908

(d) Unfunded Liability (a)-(b)-(c)	\$ 682,606

(2) Contribution Rates Amortized over 4.06 Years

(a) Present Value of Salaries During Next 4.06 Years	\$ 9,737,598
(b) Unfunded Contribution Rate (1(d)/2(a))	7.01%
(c) Normal Cost Rate (Schedule 1)	16.04

(d) Statutory Funding Rate	23.05%

Game Wardens' Retirement System

Schedule 4

Unfunded Liability Amortization Schedule

(1) Biennial Unfunded Past Service Liability Accounts

1984 Liability Account as of 7/1/90	\$	3,234,117
Interest Charge on Liability Account		538,157
Contributions Applied to Liability		1,021,747
Interest Credit on Contributions		78,799
1984 Liability Account as of 7/1/92	\$	2,671,728
1986 Liability Account as of 7/1/90	\$	-466,122
Interest Charge on Liability Account		-77,563
Contributions Applied to Liability		-147,261
Interest Credit on Contributions		-11,357
1986 Liability Account as of 7/1/92	\$	-385,067
1988 Liability Account as of 7/1/90	\$	-806,630
Interest Charge on Liability Account		-134,223
Contributions Applied to Liability		-254,837
Interest Credit on Contributions		-19,654
1988 Liability Account as of 7/1/92	\$	-666,362
1990 Liability Account as of 7/1/90	\$	-236,919
Interest Charge on Liability Account		-39,423
Contributions Applied to Liability		-74,849
Interest Credit on Contributions		-5,773
1990 Liability Account as of 7/1/92	\$	-195,720

(2) Actuarial Gain/Loss

Current Unfunded Liability (Schedule 3)	\$	682,606
Less 1984 Liability Account		2,671,728
Less 1986 Liability Account		-385,067
Less 1988 Liability Account		-666,362
Less 1990 Liability Account		-195,720

1992 Liability Account as of 7/1/92	\$	-741,973

(3) Required Contribution Rate

Normal Cost Rate (Schedule 1)	16.04%
Rate to Fund 1984 Liability Over 22 Years	5.72
Rate to Fund 1986 Liability Over 24 Years	-0.77
Rate to Fund 1988 Liability Over 26 Years	-1.24
Rate to Fund 1990 Liability Over 28 Years	-0.34
Rate to Fund 1992 Liability Over 30 Years	-1.23

Contribution Rate for 30-Year Schedule	18.18%



Game Wardens' Retirement System

Schedule 5

Comparison of Valuations

	1990	1992
(1) Unfunded Past Service Liability	-----	-----
(a) Present Value of Benefits	\$16,148,273	\$17,832,876
(b) Present Value of Future Costs	\$ 2,944,224	\$ 3,225,362
(c) Fund Assets	\$11,479,603	\$13,924,908
(d) Unfunded Liability	\$ 1,724,446	\$ 682,606
(2) Amortization Period and Contribution Rates		
(a) Years for Amortization	8.78	4.06
(b) Unfunded Contribution Rate	9.29%	7.01%
(c) Normal Cost Rate	15.96%	16.04%
(d) Statutory Funding Rate	25.25%	23.05%
(3) Active Members		
(a) Number of Members	88	87
(b) Annual Payroll	\$ 2,247,790	\$ 2,466,111
(c) Average Annual Salary	\$ 25,543	\$ 28,346
(4) Inactive Members		
(a) Number of Retired	46	49
(b) Number of Disabled	9	9
(c) Number of Survivors	3	3
(d) Number of Vested Deferred	0	0
(e) Annual Benefits	\$ 707,241	\$ 795,475
(f) Average Monthly Benefit	\$ 1,016	\$ 1,087



Game Wardens' Retirement System

Schedule 6

Table 1

Number of Active Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	
0-4	1	8	11	3	1					24
5-9		3	4	4						11
10-14			6	7	3	1				17
15-19				4	2	3				9
20-24					4	9	4	1		18
25-29							2	4		6
30-34								2		2
35-39										
40-UP										
Total	1	11	21	18	10	13	6	7		87

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Game Wardens' Retirement System

Table 2

Average Salaries of Active Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	
0-4	19877	22343	23494	23191	30470					23212
5-9		25215	25070	25136						25133
10-14			28221	28863	29031	27191				28568
15-19				30222	31236	30306				30476
20-24					31619	31908	32547	35138		32165
25-29							31859	35367		34198
30-34								44227		44227
35-39										
40-UP										
Total	19877	23126	25145	27391	30651	31176	32318	37866		28346

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Game Wardens' Retirement System

Table 3

Number of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9										
10-14										
15-19					2			1		3
20-24			3	2	2	2		2		11
25-29			2	1	1	2	5	2	1	14
30-34				4	3	3	4	2	1	17
35-39						3	1			4
40-UP										
Total			5	7	8	10	10	7	2	49

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Game Wardens' Retirement System

Table 4

Average Benefits of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9										
10-14										
15-19					485			610		527
20-24			1110	954	1010	782		617		914
25-29			1299	1165	1247	1161	863	838	790	1008
30-34				1766	1681	1624	995	928	939	1397
35-39						1951	1055			1727
40-UP										
Total			1185	1448	1160	1461	935	768	865	1151



Game Wardens' Retirement System

Table 5

Number of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9										
10-14	1			1						2
15-19					1	1				2
20-24				1	1	1	1			4
25-29										
30-34						1				1
35-39										
40-UP										
Total	1			2	2	3	1			9

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Game Wardens' Retirement System

Table 6

Average Benefits of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9										
10-14	1003			986						995
15-19					586	582				584
20-24				1268	1348	739	646			1001
25-29										
30-34						914				914
35-39										
40-UP										
Total	1003			1128	967	745	646			897

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Game Wardens' Retirement System

Table 7

Number of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9						1				1
10-14										
15-19							1			1
20-24										
25-29							1			1
30-34										
35-39										
40-UP										
Total						1	2			3

Game Wardens' Retirement System

Table 8

Average Benefits of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9						430				430
10-14										
15-19							552			552
20-24										
25-29							829			829
30-34										
35-39										
40-UP										
Total						430	690			603

Game Wardens' Retirement System

Section IV

Actuarial Funding Method

The cost of the retirement system will be determined by its future experience. In calculating the financial requirements of the fund, certain assumptions were made as to the expected future experience. This section summarizes the funding method applied as well as the actuarial assumptions used.

Any variations in the actual experience of the fund from those assumed in this valuation may cause changes in the projected future costs of the fund. It is therefore necessary that the actuarial assumptions be reviewed from time to time with adjustments as experience warrants. It is also important that regular valuations be performed to determine the financial effect of variations between the actual and assumed experience.

The assumptions used in the valuation are based upon the past experience of the fund together with projections as to future experience.

The method of funding employed is commonly referred to as the entry age normal cost method. This method establishes a normal cost as well as an unfunded accrued liability. The normal cost is the level percentage of total salaries required to fund the benefits, assuming this percentage has been contributed since each member's entry into the fund.

The unfunded accrued liability represents the excess of the present value of total liabilities over the present value of the fund assets and the present value of expected future contributions at the normal cost rate.

In order to maintain the fund on an actuarially sound basis, the rate of contribution should be such as to provide for the normal cost in addition to making progress towards the amortization of the unfunded liability.

Game Wardens' Retirement System
Discussion of Actuarial Assumptions

Mortality Rates

The mortality rates for males and females are based upon the 1983 Group Annuity Mortality Table, and apply to both active members and those receiving benefits.

Disability Rates

The disability rates for males and females are based upon the 1983 Disability Table, adjusted to reflect the higher rates experienced by the members.

Withdrawal Rates

The withdrawal rates are based upon the actual experience of the system as determined in the 1987 withdrawal experience study.

Salary Scale

The rates of salary increase are based upon an assumed compounded growth rate of 6.5% per annum.

Investment Earnings

It was assumed that the investment earnings would be 8% compounded annually.

Asset Valuation

The assets are based on market value, with gains and losses graduated over a 4-year period.

Administrative Expenses

It was assumed that the system would incur no administrative expenses beyond those provided by investment earnings in excess of 8%.

Termination Benefits

It was assumed that all members terminating with less than ten years of service would receive an immediate withdrawal of their member contributions with interest. It was further assumed that members with ten or more years of service would select the most advantageous benefits under the given assumptions.

Game Wardens' Retirement System
Illustration of Actuarial Assumptions

Mortality Rates

The mortality rates are based upon the 1983 Group Annuity Mortality Table.

Age	Deaths Per 10,000 Male Members	Deaths Per 10,000 Female Members
25	5	3
30	6	3
35	9	5
40	12	7
45	22	10
50	39	16
55	61	25
60	92	42
65	156	71
70	275	124
75	446	240
80	741	429
85	1,148	699

Disability Rates

The disability rates are based upon the 1983 Disability Table, adjusted to reflect the higher rates experienced by the members.

Age	Disabilities per 10,000 Male Members	Disabilities per 10,000 Female Members
25	3	3
30	6	9
35	9	15
40	18	27
45	36	45
50	60	66
55	153	123
60	314	260

Withdrawal Rates

The withdrawal rates illustrated below reflect the turnover experienced by the Game Wardens' Retirement System.

Age	Withdrawals Per 10,000 Active Members
25	380
30	285
35	152
40	109
45	34
50	17

Salary Scale

The salary increases are based upon an assumed compounded growth rate of 6.5% per annum.

Investment Earnings

Future investment earnings are assumed to be 8% compounded annually.

Asset Valuation

The assets are based on market value, with gains and losses graduated over a 4-year period.

Administrative Expenses

It was assumed that the administrative expenses would be recovered by investment earnings in excess of 8%.

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Game Wardens' Retirement System

Section V

Summary of Benefits and Contributions

Employee Contributions -	7.9% of member's compensation.
State Contributions -	7.15% of members' compensation, plus amounts collected from fines and forfeited bonds until the unfunded liability is solvent.
Retirement Benefit -	<p>Eligibility: Age 50 and 20 years of service.</p> <p>Normal Form: Life payments with a death benefit equal to the present value of the benefit at retirement less payments made up to the date of death.</p> <p>Benefit: 2% of final compensation for each year of service.</p>
Disability Benefit -	<p>Service Disability: 50% of final compensation provided member has at least 10 years of service.</p> <p>Nonservice Disability: Actuarial equivalent of accrued benefit based on retirement at age 50.</p>
Death Benefit -	<p>Service Death: 50% of final compensation less benefits paid from workers' compensation.</p> <p>Nonservice Death: Actuarial equivalent of accrued benefit based on retirement at age 55.</p>
Termination Benefit -	Prior to 10 years of service, return of member contributions. If involuntarily terminated after 10 years, the member may elect to receive the accrued benefit at age 55.
Benefit Adjustments -	Investment earnings in excess of 8%, if any, are used to provide post-retirement increases.

